This is a continuation of U.S. Serial No. 09/591,684 filed on June 9, 2000 entitled "Isolation System With Digital Communication Across A Capacitive Barrier" which is a continuation of U. S. Serial No. 08/841,409 filed on April 22, 1997 entitled "Isolation System With Digital Communication Across A Capacitive Barrier" (now U.S. Patent No. 6,137,827).

In the Claims:

Please cancel claims 1-32 and add new claims 33-82 as follows. The rewritten clean versions of all the pending claims are provided below.

1-32. (Cancelled).

33. (New) A bidirectional isolation system for providing an isolated communication channel for data signals in a forward direction and in a reverse direction across an isolation barrier comprised of a plurality of isolation elements, the system comprising:

(a) a powered system on a first side of the isolation barrier, the powered system comprising a first driver circuit connected to the isolation barrier for driving a forward direction digital differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor; and

(b) an isolated system on a second side of the isolation barrier, the isolated system comprising a second driver circuit connected to the isolation barrier for driving a reverse direction digital differential signal across the first isolation capacitor and the second isolation capacitor;

wherein the forward direction digital differential signal and the reverse direction digital differential signal are both driven through the same first and second isolation

capacitors so that the first and second isolation capacitors bidirectionally transfer the forward direction and reverse direction digital differential signals;

wherein the isolated system receives power from the powered system from across the isolation barrier; and

wherein the isolated system receives a clock signal from the powered system through at least one of the plurality of isolation elements.

34. (New) The isolation system of claim 33, wherein the first and second driver circuits are differential driver circuits that drive the respective forward direction and reverse direction digital differential signals across the first and second isolation capacitors.

35. (New) The isolation system of claim 33, wherein the first and second driver circuits are differential driver circuits.

36. (New) The isolation system of claim 33, wherein the forward direction digital differential signal comprises said data signal multiplexed with a control signal.

37. (New) The isolation system of claim 36, wherein the reverse direction digital differential signal comprises said data signal multiplexed with a control signal.

38. (New) The isolation system of claim 33, wherein the isolated system receives a clock signal from the powered system through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

39. (New) The isolation system of claim 33, wherein at least one of the forward direction digital differential signal and the reverse direction digital differential signal includes both data and control information.

40. (New) The isolation system of claim 33, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

41. (New) The isolation system of claim 33, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

42. (New) A bidirectional isolation system for providing an isolated communication channel for data signals in a forward direction and in a reverse direction across an isolation barrier comprised of a plurality of isolation elements, the system comprising:

(a) a powered system on a first side of the isolation barrier, the powered system comprising a first driver circuit connected to the isolation barrier for driving a forward direction digital differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor; and

(b) an isolated system on a second side of the isolation barrier, the isolated system comprising a second driver circuit connected to the isolation barrier for driving a reverse direction digital differential signal across the first isolation capacitor and the second isolation capacitor;

wherein the forward direction digital differential signal and the reverse direction digital differential signal are both driven through the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the forward direction and reverse direction digital differential signals;

wherein the isolated system receives power from the powered system from across the isolation barrier to generate at least one power supply within the isolated system;

wherein the isolated system receives a clock signal from the powered system through at least one of the plurality of isolation elements that is separate from the first isolation capacitor and the second isolation capacitor; and

wherein at least one of the forward direction digital differential signal and the reverse direction digital differential signal includes both data and control information.

43. (New) The isolation system of claim 42, wherein the first and second driver circuits are differential driver circuits that drive the respective forward direction and reverse direction digital differential signals across the first and second isolation capacitors.

44. (New) The isolation system of claim 42, wherein the first and second driver circuits are differential driver circuits.

45. (New) The isolation system of claim 42, wherein the forward direction digital differential signal comprises said data signal multiplexed with a control signal.

46. (New) The isolation system of claim 45, wherein the reverse direction digital differential signal comprises said data signal multiplexed with a control signal.

47. (New) The isolation system of claim 42, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

48. (New) The isolation system of claim 42, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

49. (New) An isolation system for providing a digital communication channel for data signals and control signals, the isolation system comprising:

an isolation barrier comprising a plurality of isolation elements;

a first multiplexer located on one side of the isolation barrier and connected to receive the data signals and the control signals and providing a first multiplexed digital differential signal that is connected to at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

a first demultiplexer located on the other side of the isolation barrier and connected to receive the first multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, wherein bidirectional communication exists through the first and second isolation capacitors and wherein the first demultiplexer has a data signal output and a control signal output;

wherein one side of the isolation barrier is an isolated side that receives power from across the isolation barrier; and

wherein the isolated side receives a clock signal from across the isolation barrier through at least one of the plurality of isolation elements.

50. (New) The system of claim 49, further comprising

a second multiplexer located on said other side of the isolation barrier and connected to receive data signals and control signals and providing a second multiplexed digital differential signal that is connected to the first isolation capacitor and the second isolation capacitor;

a second demultiplexer located on said one side of the isolation barrier and connected to receive the second multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, the second demultiplexer having a data signal output and a control signal output;

whereby the first and second multiplexed digital differential signals are transmitted across the same first and second isolation capacitors so that bidirectional multiplexed communication of data and control signals across the isolation barrier is enabled.

51. (New) The system of claim 49, wherein the first multiplexed digital differential signal includes both data information and control information.

52. (New) The system of claim 50, wherein at least one of the first multiplexed digital differential signal and the second multiplexed digital differential signal includes both data information and control information.

53. (New) The system of claim 49, wherein the isolated side receives a clock signal from across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

54. (New) The system of claim 49, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

55. (New) The system of claim 49, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

56. (New) An isolation system for providing a digital communication channel for data signals and control signals, the isolation system comprising:

an isolation barrier comprising a plurality of isolation elements;

a first multiplexer located on one side of the isolation barrier and connected to receive the data signals and the control signals and providing a first multiplexed digital differential signal that is connected to at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first

isolation capacitor and a second isolation capacitor, and wherein the first multiplexed digital differential signal includes both data information and control information; and

a first demultiplexer located on the other side of the isolation barrier and connected to receive the first multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, wherein bidirectional communication exists through the first and second isolation capacitors and wherein the first demultiplexer has a data signal output and a control signal output,

wherein one side of the isolation barrier is an isolated side that receives power from across the isolation barrier to generate at least one power supply; and

wherein the isolated side receives a clock signal from across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

57. (New) The system of claim 56, further comprising

a second multiplexer located on said other side of the isolation barrier and connected to receive data signals and control signals and providing a second multiplexed digital differential signal that is connected to the first isolation capacitor and the second isolation capacitor;

a second demultiplexer located on said one side of the isolation barrier and connected to receive the second multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, the second demultiplexer having a data signal output and a control signal output;

whereby the first and second multiplexed digital differential signals are transmitted across the same first and second isolation capacitors so that bidirectional

multiplexed communication of data and control signals across the isolation barrier is enabled.

58. (New) The system of claim 56, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

59. (New) The system of claim 56, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

60. (New) A bidirectional isolation system for providing an isolated communication channel for data signals in a forward direction and in a reverse direction across an isolation barrier comprised of a plurality of isolation elements, the system comprising:

a powered system on a first side of the isolation barrier, the powered system connected to the isolation barrier for driving a forward direction digital differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor; and

an isolated system on a second side of the isolation barrier, the isolated system connected to the isolation barrier for driving a reverse direction digital differential signal across the first isolation capacitor and the second isolation capacitor;

wherein the forward direction digital differential signal and the reverse direction digital differential signal are both driven through the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the forward direction and reverse direction digital differential signals;

wherein the isolated system receives at least some power from the powered system from across the isolation barrier; and

wherein the isolated system receives a clock signal from the powered system through at least one of the plurality of isolation elements.

61. (New) The isolation system of claim 60, wherein the forward direction digital differential signal comprises the data signal multiplexed with a control signal.

62. (New) The isolation system of claim 61, wherein the reverse direction digital differential signal comprises said data signal multiplexed with a control signal.

63. (New) The isolation system of claim 60, wherein the isolated system receives a clock signal from the powered system through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

64. (New) The isolation system of claim 60, wherein at least one of the forward direction digital differential signal and the reverse direction digital differential signal includes both data and control information.

65. (New) The isolation system of claim 60, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

66. (New) The isolation system of claim 60, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

67. (New) A bidirectional isolation system for providing an isolated communication channel for data signals in a forward direction and in a reverse direction across an isolation barrier comprised of a plurality of isolation elements, the system comprising:

a powered system on a first side of the isolation barrier, the powered system connected to the isolation barrier for driving a forward direction digital differential signal across at least two of the isolation barrier elements, the at least two isolation

barrier elements comprising at least a first isolation capacitor and a second isolation capacitor; and

an isolated system on a second side of the isolation barrier, the isolated system connected to the isolation barrier for driving a reverse direction digital differential signal across the first isolation capacitor and the second isolation capacitor;

wherein the forward direction digital differential signal and the reverse direction digital differential signal are both driven through the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the forward direction and reverse direction digital differential signals;

wherein the isolated system receives at least some power from the powered system from across the isolation barrier to generate at least one power supply within the isolated system;

wherein the isolated system receives a clock signal from the powered system through at least one of the plurality of isolation elements that is separate from the first isolation capacitor and the second isolation capacitor; and

wherein at least one of the forward direction digital differential signal and the reverse direction digital differential signal includes both data and control information.

68. (New) The isolation system of claim 67, wherein the forward direction digital differential signal comprises the data signal multiplexed with a control signal.

69. (New) The isolation system of claim 68, wherein the reverse direction digital differential signal comprises said data signal multiplexed with a control signal.

70. (New) The isolation system of claim 67, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

71. (New) The isolation system of claim 67, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

72. (New) An isolation system for providing a digital communication channel for telephone line data signals and control signals, the isolation system comprising:

an isolation barrier comprised of a plurality of isolation elements;

a first multiplexer located on the telephone line side of the isolation barrier and coupled to receive the telephone line data signals and the control signals and providing a first multiplexed digital differential signal that is coupled to at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

a first demultiplexer located on the other side of the isolation barrier and connected to receive the first multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, wherein bidirectional communication exists through the first and second isolation capacitors and wherein the first demultiplexer has a data signal output and a control signal output; and

power circuitry on the telephone line side of the isolation barrier coupled to at least one signal transmitted across the isolation barrier, the circuitry providing a power supply on the telephone line side of the isolation barrier that powers at least a portion of some circuitry on the telephone line side of the isolation barrier; and

wherein said other side of the isolation barrier is coupled to receive a clock signal from across the isolation barrier through at least one of the plurality of isolation elements.

73. (New) The system of claim 72, further comprising

a second multiplexer located on said other side of the isolation barrier and connected to receive data signals and control signals and providing a second multiplexed digital differential signal that is connected to the first isolation capacitor and the second isolation capacitor; and

a second demultiplexer located on the telephone line side of the isolation barrier and connected to receive the second multiplexed digital signal from the first isolation capacitor and the second isolation capacitor, the second demultiplexer having a data signal output and a control signal output;

whereby the first and second multiplexed digital differential signals are transmitted across the same first and second isolation capacitors so that bidirectional multiplexed communication of data and control signals across the isolation barrier is enabled.

74. (New) The system of claim 72, wherein the first multiplexed digital differential signal includes both data information and control information.

75. (New) The system of claim 73, wherein at least one of the first multiplexed digital differential signal and the second multiplexed digital differential signal includes both data information and control information.

76. (New) The system of claim 72, wherein said other side of the isolation barrier is coupled to receive a clock signal from across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

77. (New) The system of claim 72, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

78. (New) The system of claim 72, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

79. (New) An isolation system for providing a digital communication channel for telephone line data signals and control signals, the isolation system comprising:

an isolation barrier comprised of a plurality of isolation elements;

a first multiplexer located on the telephone line side of the isolation barrier and coupled to receive the telephone line data signals and the control signals and providing a first multiplexed digital differential signal that is coupled to at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor, and wherein the first multiplexed digital differential signal includes both data information and control information;

a first demultiplexer located on the other side of the isolation barrier and connected to receive the first multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, wherein bidirectional communication exists through the first and second isolation capacitors and wherein the first demultiplexer has a data signal output and a control signal output;

power circuitry on the telephone line side of the isolation barrier coupled to at least one signal transmitted across the isolation barrier, the circuitry providing a power supply on the telephone line side of the isolation barrier that powers at least a portion of some circuitry on the telephone line side of the isolation barrier; and

wherein said other side of the isolation barrier is coupled to receive a clock signal from across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.